Small Business Innovation Research/Small Business Tech Transfer

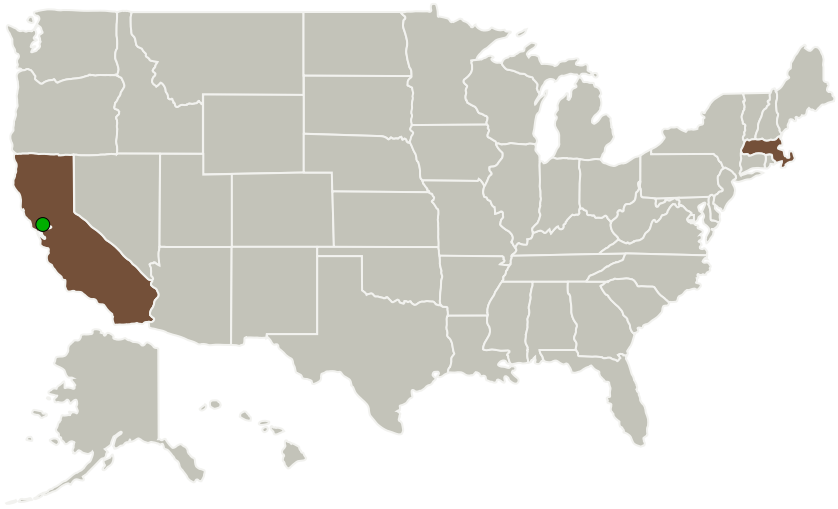
Aerodynamic Optimization for Distributed Electro Mechanical Actuators, Phase I

Completed Technology Project (2014 - 2014)

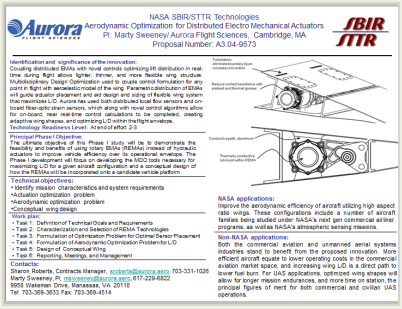
Project Introduction

Traditional hydraulic actuation and control surface layout both limit span wise control of lift distribution, and require large volume within wing cross-section, ultimately reducing efficiency. Mounting and support structures for traditional actuators, also necessitate drag-inducing protrusions in otherwise ideally smooth airfoils. Consequently, hydraulic systems are heavy and energy intensive as compared to electromechanical counterparts. Coupling distributed EMAs with novel controls optimizing lift distribution in real-time during flight allows lighter, thinner, and more flexible wing structure. Multidisciplinary Design Optimization used to couple control formulation for any point in flight with aeroelastic model of the wing. Parametric distribution of EMAs will guide actuator placement and aid design and sizing of flexible wing system that maximizes L/D. Aurora has used both distributed local flow sensors and on-board fiber-optic strain sensors, which along with novel control algorithms allow for on-board, near real-time control calculations to be completed, creating adaptive wing shapes, and optimize L/D within the flight envelope.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California



Aerodynamic Optimization for Distributed Electro Mechanical Actuators Project Image

Table of Contents

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Primary U.S. Work Locations	
California	Massachusetts

Project Transitions

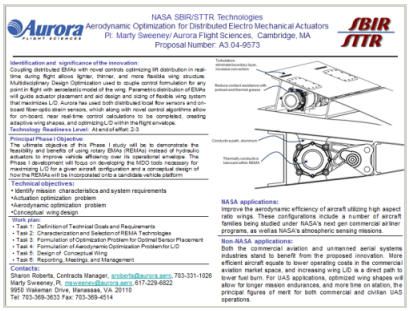
June 2014: Project Start

December 2014: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/137698)*

Images



Project Image
Aerodynamic Optimization for Distributed Electro Mechanical Actuators Project Image *(https://techport.nasa.gov/image/132510)*

Project Management

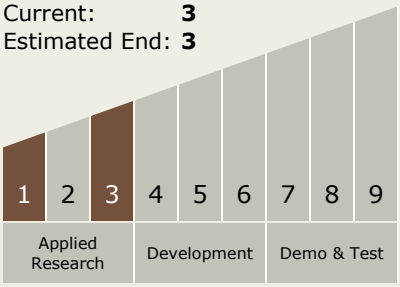
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Marty Sweeney

Technology Maturity (TRL)

Start: **1**
Current: **3**
Estimated End: **3**



Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  - TX12.3 Mechanical Systems
    - TX12.3.3 Design and Analysis Tools and Methods

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Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System